As indicated at the last working group meeting, transportation analysis is an essential part of the work that will be used to evaluate the proposed Route 238 Corridor Improvements Project and the most effective geometric layout of the revised facilities. At this meeting, we will begin to look at the future, i.e. year 2025 conditions both with and without the project. Attached to this agenda report is a significant part of the Traffic Operations Analysis Results prepared by Dowling Associates. The results for the modified project that takes less right-of-way but has less capacity, as well as analysis that incorporates a flyover from WB I-580 to SB Foothill Boulevard is still to be developed and reviewed with the Working Group. In addition to these variations, we will also review at future meetings the material regarding pedestrian and bicycle issues as well as transit issues and a discussion of accident rates within the corridor.

Revised Existing LOS Results

Before beginning the review of the future traffic results, we need to address the questions raised at the last meeting regarding reported existing LOS. One specific question concerning the LOS of F for the PM peak hour traffic at the Hazel/City Center Drive intersection, a LOS that everyone felt was not reasonable, led staff to review all of the calculated LOS results. Several conclusions were reached. With the exception of A, B, and C Streets, Dowling had used the City's standard default values for signal timing instead of the actual signal timing established for each signal by Caltrans. In addition, a careful review showed that some of the signals that do not have separate left turn phases were calculated as if they did. When these corrections were made, most of the existing LOS designations changed. Attached is a table that provides a comparison of what was previously reported to the updated values. An additional result of this more-detailed review confirmed what most people probably already know; and that is, due to the downturn in the economy, traffic congestion has eased somewhat since 2000. Specifically, the Mission/Foothill/Jackson intersection, while still LOS F in the PM, does not result in as great a delay as we have historically experienced. This result has been confirmed by recent peak hour traffic counts. This condition is not expected to persist once the economy turns around, and the future analysis should still be based on the land use and job distribution projected by the various cities and assimilated by ABAG into their forecasts.

Year 2025 Traffic Forecast

As described in more detail in Dowling's Traffic Operations Analysis paper and discussed with the working group members at our July 13 meeting, the Hayward Demand model was used to forecast traffic demand in 2025. Prior to using the model for 2025, Dowling, as well as staff, did a more detailed review of the model parameters, specifically in the corridor, and re-validated the model against the known counts. The model was then run for the 2025 no-build conditions incorporating a few changes that are expected to exist in the future. Those changes include the City's present proposal to make C Street two-way from Watkins to Foothill and providing left turns at northbound Foothill at B and C Streets and the southbound prohibition at C Street. This model was also run to generate traffic demand under conditions with the project. The project was modeled as previously described, which includes the addition of two lanes in both directions between City Center Drive and Harder Road and only one lane in each direction in the rest of the corridor. Because a curb lane has somewhat less capacity, the

proposed use of peak hour non-parking lanes was coded at 10 percent less capacity. The demand model results for both 2000 and 2025 were then used in what is referred to as a Furness process to add to the existing counts the projected growth in future traffic at each intersection. Exhibit 4 on page 10 of Dowling's report provides total intersection peak hour demand volumes forecasted for both AM and PM and both with and without the project. It should be noted that general growth in corridor traffic through 2025 averages 33 percent under no project conditions, which is consistent with the ABAG projections for household and job growth. With the Corridor Improvement Project, peak hour travel demand in the corridor would increase by 62 percent to 67 percent. These travel demand increases with the project, however, are a result of redistribution of Hayward area traffic from other more congested potential routes, which is not the same thing as what is sometimes called induced demand. A color plot of the differences in predicted year 2025 AM peak hour traffic volumes for the project and no project scenarios is on page 11 of Dowling's report. It can be seen that many north/south and east/west streets, including I-880 that are shown as green, would lose traffic as more vehicles can be accommodated in the corridor, which is shown as red.

Comparison of No-Project to With Project Scenarios

The Hayward demand model is also able to calculate other measures of comparison between the no-project and project conditions. Exhibit 6 on page 12 of Dowling's report provides specific comparisons for Vehicle Miles Traveled (VMT), Vehicle Hours Traveled (VHT), average speed, and miles of congestion. All of these measures are for the entire Hayward area bounded by Industrial Parkway on the south, Hesperian Blvd on the west, I-238 on the north, and the ridgeline on the east. As mentioned earlier, the VMT results are essentially equal for with and without the project, since the model only redistributes the projected demand; however, because there is less congestion on many streets, the VHT reduction of 1044 hours per day is significant and can later be reported as a savings in car costs and productivity.

Another measure of the effectiveness of the project is to compare intersection LOS results. One of the concepts that MTC has been working on in their modeling is that, because of the projected growth in demand and resulting congestion, it has to be expected that there will be even further peak spreading, i.e. people changing their travel habits to avoid the worst hour. As a result, the MTC has reduced their peak hour demand factors for 2025 by approximately 5 percent. Our Hayward demand model does not have this new feature, since it is only a one-hour model. After comparing MTC's 2025 screen line results to those from the Hayward model, it was determined that there is about a 5 percent peak hour spreading difference. This 5 percent reduction was taken into account before calculating the intersection LOS results for 2025 to be consistent with the MTC approach. In order to predict reasonable future LOS based on these projected movements, it was only reasonable to assume that over time Caltrans would adjust timing plans to the new demand. This assumption was incorporated by running the entire corridor through a signal optimization program called Synchro and using the new timing results to calculate future LOS for each intersection, both with and without the project. In addition, certain anticipated intersection improvements were included in both the no-project and the with project scenarios. Improvements to Mission/Carlos Bee include a double WB left turn

and a double SB left turn. Also, at Castro Valley/Mattox/Foothill, a double WB left turn, identified as needed by County staff, was assumed in the future. The results are indicated in Exhibit 12 on page 20 of Dowling's report and are attached in a simplified table including existing LOS results. Those intersections that are still operating at a LOS F in the 2025 with project analysis will be reviewed further to determine if additional intersection modifications are appropriate in the proposed project and reported on at a later working group meeting.

Prepared by:

_____
Robert A. Bauman, Deputy Director of Public Works

Recommended by:

_____
Dennis L. Butler, Director of Public Works

Approved by:

_____
Jesús Armas, City Manager

Attachments: Revised Existing LOS Results
Comparison of Existing/No Project/Project 2025 LOS Results
Preliminary Traffic Operations Analysis Results (October 14, 2003)
Revised Existing Level of Service at Study Intersections

AM old
AM new

Intersection

LOS
Delay
LOS
Delay

Foothill Blvd.- Mattox-Castro Valley Blvd.

F
66.7
D
37.4

Foothill Blvd.- Grove Way

D
25.2
C
18.8

Foothill Blvd.- City Center Dr (N) (Hazel)

C
17.2
B

10.7

Foothill Blvd.- City Center Dr. (S)

C
20.2
B
14.5

Foothill Blvd.- Russell Way

A
3.6
A
1.6

Foothill Blvd.- A Street

D
26.1
D
26.1

Foothill Blvd.- B Street

C
16.8
C
16.8

Foothill Blvd.- C Street

A
3.6
A
3.6

Foothill Blvd.- D Street

D
29.3
D
36.3

Foothill Blvd.- Mission Blvd.- Jackson St.

F
127.8
E
45.8

Jackson St. - Watkins St.

E
50.6
D
31.0

Mission Blvd.- Fletcher Lane

C
17.2
B
12.3

Mission Blvd.- Highland Ave.

B
9.1
B
13.4

Mission Blvd.- Carlos Bee Blvd..

F
91.0
F
62.4

Mission Blvd.- Harder Rd.

D
37.3
D
32.0

Mission Blvd.- Sorenson Rd.

B
8.0
B
6.3

Mission Blvd.- Calhoun St./Jefferson St.

E
50.9
D
25.1

Mission Blvd.- Hancock Street

B
25.4
A
3.9

Mission Blvd.- Tennyson Road

C
23.6
C
20.0

Mission Blvd.- Industrial Parkway

D
27.4
C
24.9

# of Intersections operating as LOS F

2

1

A - less than 5 seconds of delay

B - between 5 and 15 secods of delay

C - between 15 and 25 seconds of delay

D - between 25 and 40 seconds of delay

E - between 40 and 60 seconds of delay

F - greater than 60 seconds of delay

Note: Caltrans existing signal timings were used for new calculation

Source: Dowling Associates, Inc.

Revised Existing Level of Service at Study Intersections

PM old
PM new

Intersection

LOS
Delay
LOS
Delay

Foothill Blvd.- Mattox-Castro Valley Blvd.

F
78.1
E
49.4

Foothill Blvd.- Grove Way

D
37.5
D
30.9

Foothill Blvd.- City Center Dr (N) (Hazel)

F
70.8
D
26.3

Foothill Blvd.- City Center Dr. (S)

D
38.0
C
19.1

Foothill Blvd.- Russell Way

B
5.2
A
2.8

Foothill Blvd.- A Street

E
51.7
E
51.7

Foothill Blvd.- B Street

B
14.3
B
14.3

Foothill Blvd.- C Street

B
8.9
B
8.9

Foothill Blvd.- D Street

D
31.1
D
37

Foothill Blvd.- Mission Blvd.- Jackson St.

F
323.8
F
79.8

Jackson St. - Watkins St.

E
46.8
D
29.6

Mission Blvd.- Fletcher Lane

C
22.7
C
16.9

Mission Blvd.- Highland Ave.

B
12.3
C
18.3

Mission Blvd.- Carlos Bee Blvd..

F
69.0
E
57.4

Mission Blvd.- Harder Rd.

E
44.3
D
35.9

Mission Blvd.- Sorenson Rd.

C
18.8
C
15.1

Mission Blvd.- Calhoun St./Jefferson St.

C
24.8
B
13.2

Mission Blvd.- Hancock Street

B
8.0
B
5.4

Mission Blvd.- Tennyson Road

C
24.8
C
20.6

Mission Blvd.- Industrial Parkway

D
30.6
D
27.4

# of Intersections operating as LOS F

4

1

Levels of Service at Study Intersections

Existing *

2025 No Project **

2025 Project **

AM
PM

AM
PM

AM
PM

Intersection

LOS
Delay
LOS
Delay

LOS
Delay
LOS
Delay

LOS
Delay
LOS
Delay

Foothill Blvd.- Mattox-Castro Valley Blvd.

D
37.4
E
49.4

F
75.5
F
81.9

F
82.2
F
89.8

Foothill Blvd.- Grove Way

C
18.8
D
30.9

E
48.5
F
71.7

E
45.7
E
44.6

Foothill Blvd.- City Center Dr (N)(Hazel)

B
10.7
D
26.3

C
21.0
E
57.9

C
19.1
E
41.9

Foothill Blvd.- City Center Dr. (S)

B
14.5
C
19.1

C
21.1
E
56.4

C
22.5

E
55.6

Foothill Blvd.- Russell Way

A
1.6
A
2.8

A
1.6
A
2.6

n/a
n/a
n/a
n/a

Foothill Blvd.- A Street

D
26.1
E
51.7

F
111.4
F
191.0

F
192.7
F
190.7

Foothill Blvd.- B Street

C
16.8
B
14.3

F
65.2

F
103.6

D
36.5
D
37.8

Foothill Blvd.- C Street

A
3.6
B
8.9

C
16.8
F
64.0

B
9.2
B
14.8

Foothill Blvd.- D Street

D
36.3
D
37.0

F
165.t
F
144.6

F
78.9
F
93.4

Foothill Blvd.- Mission Blvd.- Jackson St.

E
45.8

F
79.8

E
53.5
F
211.2

B
14.1
C
15.1

Jackson St. - Watkins St.

D
31.0
D
29.6

F
119.6
F
233.2

E
57.7
E
55.4

Mission Blvd.- Fletcher Lane

B
12.3
C
16.9

C
19.7
C
15.9

C
19.5
C
24.7

Mission Blvd.- Highland Ave.

B
13.4
C
18.3

C
23.5
E
42.3

C
15.5
C
16.8

Mission Blvd.- Carlos Bee Blvd.

F
62.4
E
57.4

F
61.5
F
91.1

D
38.5
E
43.8

Mission Blvd.- Harder Rd.

D
32.0
D
35.9

F
64.6
F
73.4

F
114.5
F
125.9

Mission Blvd.- Sorenson Rd.

B
6.3
C
15.1

B
8.8
C
21.5

B
6.7
B
14.6

Mission Blvd.- Calhoun St./Jefferson St.

D
25,1
B
13.2

F
176.9
F
112.7

F
63.2
F
69.9

Mission Blvd.- Hancock Street

A
3.9
B
5.4

B
6.8
B
9.5

B
5.6
B
7.4

Mission Blvd.- Tennyson Road

C
20.0
C
20.6

D
37.9
E
48.8

F
67.3
E
47.5

Mission Blvd.- Industrial Parkway

C
24.9
D
27.4

D
30.0
D
27.0

E
41.6
E
55.8

# of Intersections operating as LOS F

1

1

8

11

6

5

Key (using 1994 Highway Capacity Manual

Methodology)

A - less than 5 seconds of delay

B - between 5 and 15 secods of delay

C - between 15 and 25 seconds of delay

D - between 25 and 40 seconds of delay

E - between 40 and 60 seconds of delay

F - greater than 60 seconds of delay

* Caltrans existing signal timings were used

** Optimized signal timings were used

Source: Dowling Associates, Inc.

Preliminary
Traffic Operations Analysis Results
for
The
State Route 238 Corridor Improvement Project

Prepared for

The City of Hayward

By

Dowling Associates, Inc.
180 Grand Avenue, Suite 250, Oakland, CA

October 14, 2003

I. Introduction

The purpose of this report is to document the traffic operations analysis for the Route 238 Corridor Improvement Project. The study area involves the corridor defined by Foothill Boulevard south of Mattox/Castro Valley to the Foothill/Jackson/Mission intersection; then Mission Boulevard south to Industrial Parkway.

The elements of the transportation environment analyzed for this report include the following:
Traffic Forecasting, and
Traffic Operations Analysis

After this information is presented to and reviewed by the project's "Working Group," there will likely be additional analyses needed based on requests from the group, such as suggested modifications to the proposed project.

Description of Analysis Scenarios
The traffic analysis focuses on three analysis scenarios: Existing Conditions, Year 2025 No-Project, and Year 2025 With Project. The major street improvements under each analysis scenario are summarized in
REF _Ref53298629 \h
Exhibit 1
.

The 2025 No-Project scenario includes signal timing optimization for the future demand levels plus a few street improvements at individual intersections that are expected to be built by the year 2025 in the absence of the Corridor Improvement project:

Northbound left-turns will be permitted at B Street
Northbound and southbound left-turns will be permitted at C Street
Tennyson Street will be extended to the east of Mission Blvd and the existing La Vista Quarry intersection with Mission will no longer be signalized.
A second westbound left turn lane will be added to Castro Valley at Foothill.
A second westbound left turn lane and a second southbound left turn lane will be added at Carlos Bee and Mission.

The 2025 Project scenario includes the Mission/Jackson/Foothill Grade Separation, some side street closures, and signal timing optimization for the corridor.

Exhibit
SEQ Exhibit * ARABIC
. Corridor Geometry for Existing, No-Project, and Project Scenarios

Existing
2025 No Project
2025 With Project

Intersection
Thru Lanes
Left-turn Lanes
Thru Lanes
Left-turn Lanes
Thru Lanes
Left-turn Lanes

Foothill & Mattox

Both

Both

Both

3

3

3 / 4**

Foothill & Grove

Both

Both

Both

3

3

4

Foothill & Hazel

Both

Both

Both

3

3

4

Foothill & City Ctr

Both

Both

Both

3

3

5

Foothill & Russell

SB

SB

Closed

3

3

5

Foothill & A

None

None

Both

3

3

5

Foothill & B

None

NB

NB

3

3

5

Foothill & C

None

Both

Both

3

3

5

Foothill & D

None

None

SB

3

3

5

Foothill/Mission/Jackson

*

*

Grade Sep.

2/3

2/3

4

Mission & Fletcher

Both

Both

Both

3

3

4

Mission & Highland

Both

Both

Both

2

2

4

Mission & Carlos Bee

Both

Add 2nd SB & WB

Add 2nd SB & WB

2

2

4

Mission & Central

Both

Both

None

2

2

4

Mission & Berry

NB

NB

NB

2

2

4

Mission & Torrano

SB

SB

SB

2

2

4

Mission & Harder

Both

Both

Both

2

2

3

Mission & Sorenson

NB

NB

NB

2

2

3

Mission & Jefferson/Calhoun

Both

Both

Both

2

2

3

Mission & Hancock

Both

Both

Both

2

2

3

Mission & Tennyson

NB

Both

Both

2

2

3

Mission & La Vista Quarry

Both

None

None

2

2

3

Mission & Valle Vista

Both

Both

NB

2

2

3

Mission & Industrial

Both

Both

Both

*Lefts permitted from WB Foothill onto SB Mission and from EB Jackson onto NB Mission
**Expansion to 4 through lanes at Apple/I-580/I-238 Ramps
Shaded boxes indicate changes from Existing.

REF _Ref53628976 \h
Exhibit 2
shows the specific changes to intersection lane geometries for each scenario. It is presented in a very dense format to allow all the lane geometries for each scenario to be summarized in two pages.

A sequence of 6 digits is given for each approach which show, from left to right, the number of left turn lanes (first digit), shared left-through lanes (second digit), through lanes (third digit), shared through-right lanes (fourth digit), right turn lane (fifth digit), shared left-through-right lanes (last digit). For example, for the southbound (SB) approach of the intersection of Foothill and Mattox, the exhibit shows the code "302100" for existing conditions. This six digit code means that this approach currently has 3 left turn lanes, no shared left-through lanes, 2 through lanes, 1 shared through-right lane, no right turn lanes, and no shared left-through-right lanes.

If the lane geometry does not change between the existing and no-project scenarios, then the no-project row is left blank for that particular approach. If the lane geometry does not change between the no-project and project scenarios, then the "project" row for that approach is left blank.

The specific signal timing for each intersection under each scenario is sh
own in the TRAFFIX"℠ level of service calculation sheets presented in the Technical Appendix. The signal timings for the future scenarios were optimized to serve the predicted future demands.

own in the TRAFFIX™ level of service calculation sheets presented in the Technical Appendix. The signal timings for the future scenarios were optimized to serve the predicted future demands.

Exhibit

Exhibit
SEQ Exhibit * ARABIC
SEQ Exhibit * ARABIC
. Scenario Intersection Lan擁□潭整
ne Geometries

Dowling Associates, Inc. -- Highway 238 -- P 03039
Lane Geometry Scenario Comparison Report

Number of approach lanes: (L) (LT) (T) (RT) (R) (LTR)
(Approach blank if no change)

Node	Intersection	Scenario	NB	SB	EB	WB
1	Foothill & Mattox	Existing_	200020	302100	002100	102000
1	Foothill & Mattox	NoProject_				202000
1	Foothill & Mattox	Project_				
2	Foothill & Grove	Existing_	102100	102100	100100	101010
2	Foothill & Grove	NoProject_				
2	Foothill & Grove	Project_	103100	103100		
3	Foothill & Hazel	Existing_	102100	102100	100100	101010
3	Foothill & Hazel	NoProject_				
3	Foothill & Hazel	Project_	103100	103100		
4	Foothill & City Center	Existing_	103010	103010	101100	100110
4	Foothill & City Center	NoProject_				
4	Foothill & City Center	Project_	103100	103100		
5	Foothill & Russell	Existing_	002100	103000	000000	000020
5	Foothill & Russell	NoProject_				
5	Foothill & Russell	Project_	004000	004000	000000	
6	Foothill & A	Existing_	002100	002100	101100	101100
6	Foothill & A	NoProject_				
6	Foothill & A	Project_	104010	104100		
7	Foothill & B	Existing_	003000	002100	000000	111010
7	Foothill & B	NoProject_	103000			
7	Foothill & B	Project_	105000	004100		
8	Foothill & C	Existing_	003010	003000	111010	000000
8	Foothill & C	NoProject_	102100	102100	011010	
8	Foothill & C	Project_	104100	104100	110100	

9 Foothill & D	Existing_	002100	002100	111000	201100
9 Foothill & D	NoProject_		110100		
9 Foothill & D	Project_	004100	104100		
10 Mission/Foothill/Jackson	Existing_	002020	001110	202100	301100
10 Mission/Foothill/Jackson	NoProject_				
10 Mission/Foothill/Jackson	Project_	002000	002010	100000	300000
11 Jackson & Watkins	Existing_	102100	101100	010010	000001
11 Jackson & Watkins	NoProject_				
11 Jackson & Watkins	Project_	000001	000001		
12 Mission & Fletcher	Existing_	102100	102100	010010	100100
12 Mission & Fletcher	NoProject_				
12 Mission & Fletcher	Project_	103100	104100		

†††催淅数瑣□†††㊮㈰～‰～ぐく幺～～～‰ノ ～～～□†幺‰ 慊正濯…憖歷湩□†††††□楸瑳湩彧†††幺㈰く‰く ㄱ～㊮く□‰～～～□†ㄱ□捡獫湯☠圠瑯楫獮†††††††澈牾楞捥杓†††††††††††††††o †幺‰ 慊正濯…憖歷湩□†††††催淅数瑣□†††㊮～～～‰～～～□†††††††□†幺′畝獳潠…汆瑙档牴†††††□楸瑳湩彧†††幺㈰く‰く ㄱ～㊮く□‰く□～†㈱□獩楳湯☠□敬捻敨□†††††澈牾楞捥杓†††††††††††††††o †幺′畝獳潠…汆瑙档牴†††††催淅数瑣□†††幺ﾋｭく‰く ㄴ～†††††††□

Dowling Associates, Inc. -- Highway 238 -- P 03039
Lane Geometry Scenario Comparison Report

Number of approach lanes: (L) (LT) (T) (RT) (R) (LTR)
(Approach blank if no change)

Node	Intersection	Scenario	NB	SB	EB	WB
13	Mission & Highland	Existing_	101100	101100	010010	010010
13	Mission & Highland	NoProject_				
13	Mission & Highland	Project_	103100	103100	100100	100100
14	Mission & Carlos Bee	Existing_	101100	102010	102010	102010
14	Mission & Carlos Bee	NoProject_	102010	202010	201100	202010
14	Mission & Carlos Bee	Project_	103100	203100		
15	Mission & Central	Existing_	001100	102000	000000	000001
15	Mission & Central	NoProject_				
15	Mission & Central	Project_	003100	004000	000010	
16	Mission & Berry	Existing_	102000	001100	000001	000000

16 Mission & Berry NoProject_
16 Mission & Berry Project_ 104000 003100

17 Mission & Torrano Existing_ 001100 101100 000001 000001
17 Mission & Torrano NoProject_
17 Mission & Torrano Project_ 003100 103100

18 Mission & Harder Existing_ 102010 102010 102010 102010
18 Mission & Harder NoProject_ 111010 111010
18 Mission & Harder Project_ 102100 102100

19 Mission & Sorenson Existing_ 102000 001100 100001 000000
19 Mission & Sorenson NoProject_
19 Mission & Sorenson Project_ 103000 002100

20 Mission & Jefferson/Calhoun Existing_ 101100 101100 000001 000001
20 Mission & Jefferson/Calhoun NoProject_
20 Mission & Jefferson/Calhoun Project_ 102100 102100 010010

22 Mission & Hancock Existing_ 101100 101100 000001 000001
22 Mission & Hancock NoProject_
22 Mission & Hancock Project_ 102100 102100

23 Mission & Tennyson Existing_ 202000 003010 200010 000000
23 Mission & Tennyson NoProject_ 201100 103010 200100 101100
23 Mission & Tennyson Project_ 202100 200110 101010

24 Mission & La Vista Quarry Existing_ 101100 102100 000001 000001
24 Mission & La Vista Quarry NoProject_ No Intersection
24 Mission & La Vista Quarry Project_ No Intersection

25 Mission & Valle Vista Existing_ 101100 101100 000001 000001
25 Mission & Valle Vista NoProject_
25 Mission & Valle Vista Project_ 102100 102100

26 Mission & Industrial Existing_ 202100 102100 201110 102010
26 Mission & Industrial NoProject_
26 Mission & Industrial Project_

†北偯淵数瑣□†††††††††††††††ぐ□獩楳湯☠□晲敦獲湯□污澡渓††腸楞捥礽†††††く ㄱㄱ～幺㈰く‰†††㊼く□ο †㈲□獩楳湯☠□渦潣正†††††††硅獩楴柿□†††く ㄱ～～幺□く‰～～～□㊼～～～ο †㈠′畾獳潠…慈据捯†††††北偯淵数瑣□†††††††††††††††††㈲□獩楳湯☠□渦潣正†††††††腸楞捥礽††††く ㄱㄱ～幺㈰く‰†††††††ο †ﾌｧﾗｯﾄﾞ□獩楳湯☠吠滾祜潳†††††硅獩楴柿□†††ぐぐ～～㊼ﾋﾟｺ□‰ぐ～く㊼～～～ο †㈠″畾獳潠…敔湮獷湯†††††北偯淵数瑣□††㈠□く‰く／く㈠～く‰く ㄱ～†ﾌｧﾗｯﾄﾞ□獩楳湯☠吠滾祜

澱†††††††楯楞捥祐†††††ぐㄇ～†††††ぐ□く幺□□ơ †□□獩楳湯☠□□榔瑳□畑牡褪†††硅獩楴柿□†††く ㄱ～幺㈰く‰～～～□㊮～～～ο †㈠‴ 畝獳潠…慌嘎獩慴儠慵牲⁹ ††北偯淵数瑣□††北恬整獲捥楴湯†□□獩楳湯☠□□榔瑳□畑牡褪†††楯楞捥祐†††††澱□瑮牪斀瑣潠 previous†□□獩楳湯☠嘎污敬嘎獩慴†††††硅獩楴柿□†††く ㄱ～幺□く‰～～～□㊮～～～ο †㈠丶 畝獳潠…慖菜□榔瑳□††††北偯淵数瑣□†††††††††††††††□□獩楳湯☠嘎污敬嘎獩慴†††††楯楞捥祐††††く ㄱ～幺㈰く‰†††††ο †□□獩楳湯☠□摯獵牴悽†††††硅獩楴柿□†††ぐㄇ～幺㈰く‰ぐㄱく幺㈰□ơ †㈠〝 畝獳潠…恬畤瑳械污†††††北偯淵数瑣□†††††††††††††††□□獩楳湯☠□摯獵牴悽†††††楯楞捥祐†††††††††††††††ο □

†倠淵数瑣□†††幺㈰く‰く ㄱ～††††□～く □†㈠′畝獳潠…慈据捯†††††□楸瑳湩彧†††幺□く‰く ㄱ～㊮～～～‰ ～～～□†㈲□獩楳湯☠□溤潣正††††††澱楯楞捥祐†††††††††††ο †㈠′畝獳潠…慈据捯†††††倠淵数瑣□†††幺㈰く‰く ㄱ～†††††††□†㈠″畝獳潠…敔湮獹湯†††††□楸瑳湩彧†††㈠㈰～‰～ / く㈠～□‰～～～～†ファラッド□獩楳湯☠吠滨袺潳†††††澱楯楞捥祐†††ぐㄱ～幺ピュ□‰ぐ□～幺□くơ †㈠″畝獳潠…敔湮獹湯†††††倠淵数瑣□†††㈠㈰く‰†††㈠～ㄱ‰くくく□†㈠‴ 畝獳潠…慌嘎獩慴儠慵牲⁹ ††□楸瑳湩彧†††幺□く‰く ㄱ～㊮～～～‰ ～～～□†□□獩楳湯☠□□榔瑳□畑牡褪†††澱楯楞捥祐†††澱□瑮牪斀瑣潠 previous†㈠‴ 畝獳潠…慌嘎獩慴儠慵牲⁹ ††倠淵数瑣□†††北恬整獲捥楴湯□†㈠丶 畝獳潠…慖菜□榔瑳□††††□楸瑳湩彧†††幺□く‰く ㄱ～㊮～～～‰ ～～～□†□□獩楳湯☠嘎污敬嘎獩慴†††††澱楯楞捥祐†††††††††††ο †㈠丶 畝獳潠…慖菜□榔瑳□††††倠淵数瑣□†††幺㈰く‰く ㄱ～†††††††□†㈠〝 畝獳潠…恬畤瑳械污†††††□楸瑳湩彧†††㈠㈰く‰く ㄱ～㈠□ㄱ‰くぐく†□□獩楳湯☠□摯獵牴悽†††††澱楯楞捥祐†††††††††††††††ο †㈠〝 畝獳潠…恬畤瑳械污†††††倠淵数瑣□†††††††††††††††□□ 牏

II. Traffic Forecasting

This chapter documents the process used to develop the traffic forecasts for the Hayward Route 238 Corridor Improvement Project.

The City of Hayward Planning Area EMME2 travel demand model was used to develop the traffic demand forecasts. The City of Hayward model was recently updated to ABAG Projections 2000 for the base year 2000 and Projections 2002 for the year 2025 forecasts. The model was validated to a system of 10 screenlines with recent counts for the AM and PM peak hour time periods.

The city model was reviewed, refined, and revalidated within the Route 238 corridor. Minor coding errors in the original model (turn penalties, number of lanes, etc.) were identified and corrected. The refined model was then revalidated within the Route 238 corridor.

The revalidated model was then used to forecast the Year 2025 AM and PM peak hour traffic demands for the corridor. The link level traffic demands were then used to estimate the AM and peak hour turning movements for each of the 26 analysis intersections in the corridor. A Furness adjustment process (explained below) was used to convert model link level forecasts into future turning movements.

Traffic Counts

AM and PM peak hour counts were assembled for 25 intersections from city files or counted in the field by Dowling Associates and Pang Ho Associates (see
REF _Ref53298692 \h
Exhibit 3
below). Most of the new counts were made in May 2003. Some counts, which could not be made in May were made in June and July, 2003 during school summer vacation. The counts obtained from city files ranged from September 1999 to June 2002.

Because the counts were made over a variety of years and included counts made during school summer vacation, it was necessary to compare the counts at adjacent intersections of t
‹潴□涀□ぐ㈱⍟ □捥畝敨珟敨挠畯瑐□敷敲洋摡□癯牥愱瘠牡敦祴漠□敹牡□渭□湩汝摡揚挠畯瑐□慦敗搠牽湩□摇澡泓猭澎歞□慶慣楴湯 瑩眠猲渠捥獩慳禋珟潣灭牡□桲□潣涀獚愱⁴ 摡慲散瑐粲瑐牥敨瑣潠獮漠□the corridor and balance them for discrepancies in the counted volumes on Mission and Foothill Boulevard. The final balanced counts are documented in the Technical Appendix along with the TRAFFIX™ results.

The balanced counts were used to check the valid瑯潠景
ation of the city demand model for the corridor and in the Furness process used to compute future turning movements from the city demand model link forecasts for the no-project and project scenarios.
Exhibit
SEQ Exhibit * ARABIC
. Intersection Count Dates
ID
Street 1
Street 2
AM Traffic Count Date
AM Source
PM Traffic Count Date
PM Source

1
Foothill
Mattox
05/20/2003

PHA
05/20/2003
PHA

2
Foothill
I-580 On-Ramp
06/24/2003
Dowling
06/24/2003
Dowling

3
Foothill
Grove
07/09/2002
City
06/24/2003
Dowling

4
Foothill
Hazel / City Center
05/20/2003
PHA
05/20/2003
PHA

5
Foothill
City Center
05/20/2003
PHA
05/20/2003
PHA

6
Foothill
Russell
06/25/2003
Dowling
06/25/2003
Dowling

7
Foothill

A
02/16/2000
City
02/16/2000
City

8
Foothill
B
02/16/2000
City
02/16/2000
City

9
Foothill
C
02/16/2000
City
02/16/2000
City

10
Foothill
D
05/20/2003
PHA
05/20/2003
PHA

11
Foothill / Mission
Jackson
05/14/2003
10/09/2003
PHA
10/09/2003
PHA

12
Mission
Fletcher
05/20/2003
PHA
05/20/2003
PHA

13
Mission
Highland
05/20/2003
PHA
05/20/2003
PHA

14
Mission
Carlos Bee
05/14/2003
PHA
June 2001
City

15
Mission
Central
05/20/2003
PHA
05/20/2003
PHA

16
Mission
Berry
05/13/2003
PHA
05/13/2003
PHA

17
Mission
Torrano
05/13/2003
PHA
05/13/2003
PHA

18
Mission
Harder
05/14/2003
PHA

June 2001
City

19
Mission
Sorenson
05/13/2003
PHA
05/13/2003
PHA

20
Mission
Calhoun / Jefferson
06/12/2002
City
06/12/2002
City

21
Mission
Hancock
05/14/2003
PHA
09/18/1999
City

22
Mission
Tennyson
05/14/2003
PHA
June 2001
City

23
Mission
La Vista Quarry
06/24/2003
Dowling
06/24/2003
Dowling

24
Mission
Valle Vista

05/13/2003
PHA
05/13/2003
PHA

25
Mission
Industrial
05/14/2003
PHA
12/05/2000
City

26
Jackson
Watkins
06/03/2003
City
06/03/2003
City

Bold Entries indicate older counts or counts made during school summer vacation

Our initial review of the traffic count history at the intersection of Foothill/Jackson and Mission found that the Year 2001 PM Peak hour counts were significantly higher than the May 2003 counts at adjacent intersections. Consequently the intersection was recounted in October 2003 to verify the year 2003 volumes for this intersection. Both AM and PM peak hours were recounted and it was found that the AM peak hour in October was about 12% higher than in May, and the PM peak hour was about 1% higher than the May 2003 counts at adjacent intersections. The new counts were used to report the current level of service at this intersection, however; in order to maintain consistency with the other Spring 2003 counts in the corridor, the balanced May 2003 counts were used at this intersection for the VISSIM calibration process and the Hayward Demand Model validation.

The specific adjustments made to the counts at each intersection are listed and explained in The Technical Appendix.

Model Refinement/Revalidation
As part of the Hayward 238 Corridor Improvement Project, the City Model was reviewed in the corridor and elements of the model were adjusted based on existing conditions. These elements include:

Land use data was adjusted for select TAZs in the existing and future models based on

corrected information from City staff. Land use totals remained the same as the adjustment involved simply moving households from select TAZs to neighboring TAZs. Network corrections were made in the corridor based on city input, including D Street widening from 2 to 4 lanes, and reducing Watkins from 2 lanes southbound to one lane in each direction. Other changes included correcting First Street to a one-way street south of C Street and C Street was changed to two-way from Watkins Avenue to Foothill Boulevard in the future network based on proposed changes planned by the city.
Turn penalties were added into the year 2000 existing model to simulate the existing turn prohibitions observed on Foothill Boulevard to selected cross streets.
Turn penalties were added accordingly in the future 2025 model to simulate different turning conditions in the 238 corridor due to street closures, median closures and turn permissions that will be different to existing.
TAZ (traffic analysis zone) connectors were adjusted at select locations in downtown to reflect the absence of mid-block loading points.
TAZ connectors were added in future conditions to Tennyson Road Extension and Alquire Parkway to simulate new connections.

Based on the above changes, the existing model was revalidated to existing counts obtained from the 24 study intersections (combined turn counts were summed to create link counts). The revalidated model was compared to the balanced counts at the study intersections and the model results were used in the Furness incremental adjustment process.

The EMME2 model validation results for the AM and PM peak hours are shown in the Technical Appendix. The model predicted the total existing AM peak hour traffic within 7% for the north-south direction of the corridor, and within one percent for the east-west streets in the corridor.
The model predicted the total existing PM peak hour traffic within 7% for the north-south direction of the corridor, and within 13% for the east-west streets in the corridor. The model predictions for individual streets had higher variations.

Traffic Forecast Results

The demand model predicts that peak hour travel demand in the corridor will increase by 33% between 2003 and 2025 under the “no-project” scenario (see
REF _Ref53298822 \h
Exhibit 4
below). Peak hour travel in the corridor is defined here as the sum of the intersection volume totals, The proposed Corridor Improvement project would increase peak hour travel demand in the corridor by 62% to 67% between 2003 and 2025.

The travel increases related to the corridor improvement project are however, a result of redistribution of traffic from other more congested potential routes, which is not the same thing as what is sometimes called induced demand. A plot of the differences in the predicted Year 2025 AM peak hour traffic volumes for the project and no-project scenarios (see

REF _Ref53623383 \h
Exhibit 5
) shows that the increased demand on the corridor improvement project results from reduced demand on both other north south routes and east west routes serving the corridor.
A general analysis of total amount of traffic entering the corridor at either end and at the cross streets indicates almost no change between the project and no-project scenarios which shows that more vehicles are taking longer trips in the corridor. As a result several north-south and east-west city streets within Hayward would see reductions (compared to Year 2025 no-project) as the corridor improvement project retains traffic within the corridor. Even the I-880 freeway would see a modest reduction in traffic (compared to no-project) with the corridor improvement project.

The Hayward Travel Demand Model predicts that total vehicle-miles traveled in the Hayward area (the quadrangle bounded by Industrial Parkway on the south, Hesperian Blvd. on the west, I-238 freeway on the north, and the ridgeline on the east) during the AM and PM peak hours will increase 36% between the year 2000 and 2025 under both the no-project and project scenarios (see
REF _Ref53816352 \h
Exhibit 6
).

Total vehicle-hours traveled during the peak hours will increase 67% between 2000 and 2025 under the no-project scenario. The proposed project would reduce this increase to 63%.

The mean speed of traffic during the peak hours would drop 19% between 2000 and 2025 under the no-project scenario. The proposed project would reduce this decrease in mean speed to 17%.

The total number of centerline miles that are congested would increase 179% between 2000 and 2025 under the no-project scenario. The proposed project would reduce this increase in congestion to 141%.
Exhibit
SEQ Exhibit * ARABIC
. Summary of AM and PM Peak Hour Traffic Forecast Results

AM Peak Hour
PM Peak Hour

East/West
Existing
No-Project
Growth
Project
Growth

Existing
No-Project
Growth
Project
Growth

MATTOX
4,150
6,282
51%
6,780
63%
4,482
6,491
45%
6,813
52%

GROVE
5,205
7,095
36%
8,364
61%
5,581
7,626
37%
8,797
58%

HAZEL
4,668
6,204
33%
7,568
62%
5,075
6,717
32%
7,965
57%

CITY CTR
4,389
5,552
26%

7,008
60%
4,734
6,058
28%
7,390
56%

RUSSELL
3,480
4,690
35%
6,003
73%
3,933
5,170
31%
6,323
61%

A STREET
5,336
7,671
44%
9,578
79%
5,835
8,021
37%
9,717
67%

B STREET
4,921
6,997
42%
9,130
86%
5,047
7,288
44%
9,044
79%

C STREET
4,607

6,504
41%
8,793
91%
5,056
7,525
49%
9,424
86%

D STREET
6,332
8,467
34%
10,916
72%
5,998
7,954
33%
10,854
81%

JACKSON
6,625
8,992
36%
10,898
64%
7,277
9,863
36%
11,487
58%

WATKINS
3,814
5,579
46%
5,595
47%
4,076
5,865
44%
5,509
35%

FLETCHER
4,268
5,525
29%
7,647
79%
4,608
5,980
30%
7,987
73%

HIGHLAND
3,946
5,115
30%
7,290
85%
4,361
5,656
30%
7,680
76%

CARLOS B
5,170
6,750
31%
9,013
74%
4,860
6,491
34%
8,616
77%

CENTRAL
3,499
4,819
38%
7,037
101%
3,479
4,489
29%
6,558

89%

BERRY
3,382
4,473
32%
6,685
98%
3,314
4,473
35%
6,553
98%

TORRANO
3,425
4,528
32%
6,755
97%
3,357
4,548
35%
6,643
98%

HARDER
4,652
6,116
31%
8,075
74%
4,634
6,102
32%
8,099
75%

SORENSON
3,883
5,107
32%
6,673
72%
4,177
5,412

30%
6,885
65%

JEFFERSON
4,041
5,118
27%
0
-100%
4,048
4,961
23%
0
-100%

CALHOUN
3,677
4,307
17%
6,925
88%
3,900
4,474
15%
6,919
77%

HANCOCK
3,664
4,338
18%
6,086
66%
4,067
4,674
15%
6,521
60%

TENNYSON
4,189
5,810
39%
7,300
74%

4,587
6,281
37%
7,532
64%

LA VISTA
3,314
4,127
25%
5,745
73%
3,551
4,476
26%
6,118
72%

VALLE VISTA
3,332
4,005
20%
5,344
60%
3,480
4,259
22%
5,618
61%

INDUSTRIAL
4,410
5,680
29%
6,435
46%
4,551
5,878
29%
6,746
48%

112,379
149,851
33%

187,643
67%
118,068
156,732
33%
191,798
62%

Notes:
1. Growth = The ratio of the future traffic forecast (either no-project or project) to existing traffic minus one.
2. Table represents balanced volumes for existing and Furness adjusted demand model volumes for the two future scenarios, no-project and project.
Exhibit
SEQ Exhibit * ARABIC
. Difference Plot 2025 Project Versus No-Project
Exhibit
SEQ Exhibit * ARABIC
. Hayward Demand Model Results
2000 Model
VMT
VHT
AV SPEED (MPH)
MILES of Congestion

AM Peak Hour
399,616
12,567
31.8
32.6

PM Peak Hour
403,534
12,347
32.7
31.8

Sum
803,150
24,914
32.2
64

2025 No-Project

AM Peak Hour
543,915
21,001
25.9
87.1

PM Peak Hour
547,484
20,713
26.4
92.3

Sum
1,091,399
41,714
26.2
179

% Growth No-Proj/2000
36%
67%
-19%
179%

2025 With-Project

AM Peak Hour
543,840
20,456
26.6
73.4

PM Peak Hour
546,819
20,214
27.1
81.9

Sum
1,090,659
40,670
26.8
155

% Growth Project/2000
36%
63%
-17%
141%

VMT = Vehicle-Miles Traveled

VHT = Vehicle-Hours Traveled

Computation of Turn Movement Forecasts

The results from the future model runs were input into the TURNS program that produces the Furness Incremental adjustment process. Finally the results were input into an excel spreadsheet. This was followed by a rigorous review and manual adjustment of the future furnessed turns to ensure results are consistent.

The Furness process was performed as follows:
The controlling approach /departure volumes in the Furness calculations is computed as follows:

Control volume = [Counts data] + [Future model volumes - Base model volumes]

Note that if the "Future minus Base" computation results in a negative value a warning message is generated and this term is set to zero. The resulting calculation will then simply equal the Counts value.

If the Future approach or departure volume is zero and the Base approach or departure volume is greater than zero, then the resulting computed approach or departure volume will be set to zero. This would be the case when a link is deleted in the Future model network, or a two-way link is converted to one-way. This ensures that Furness turn volumes won't be assigned to or from a deleted link.

Once the controlling approach and departure totals are known for the intersection, then the traffic count (for existing conditions) is factored up to match the controlling approach and departure totals.

The existing turn count is arranged in matrix form, with rows representing approach turn moves and columns representing departure destinations (left, through, right, u-turn).

The rows of the turn count matrix are first growth factored so that the sum of the entries in each row matches the desired controlling approach volume.

Then the column totals are computed and the ratios of the computed totals to the desired controlling departure volumes become the growth factors that are then applied to each entry in the columns.

This row and column factoring process (known as a Furness adjustment process) is repeated until the desired closure criterion is achieved (actual row and column totals are close enough to the target totals), or the maximum number of iterations set by the analyst has been reached.

The resulting turn move forecasts for the AM and PM peak hours were then reviewed for reasonableness and manually adjusted where it was judged that the furnessing process had caused unreasonably low or high turn movements.

The following changes were made to the No-Project and Project turning movements to account for left turn pockets that will be added to Foothill at “B” Street and “C” Street:
B Street: make NB left 54 vph in AM, and 252 vph in PM.
C Street: make NB left 119 vph in AM, and 142 vph in PM.

These values were taken from the “C” Street Study.

The final turning movement forecasts are shown in the Technical Appendix as part of the TRAFFIX"℠ level of service calculation sheets.

Peak Spreading

The Metropolitan Transportation Commission (MTC) regional travel demand model includes a peak hour spreadi湧潤畬
ing module that predicts how much the peak hour demand will spread in response to traffic congestion. The Hayward Travel Demand Model does not contain a peak-spreading module. When the Hayward Demand Model peak hour forecasts for 2025 are compared to those produced by the MTC model, the Hayward Model forecasts for a typical north south screen line are generally 5% greater than the MTC forecasts.

Consequently, to provide better consistency with the MTC model, the Hayward Model peak hour forecasts for 2025 have been reduced 5% to account for peak spreading. The forecasts with peak spreading are used in the level of service analysis.

III. Traffic Operations Analysis

The traffic operations analysis portion of this study is intended to characterize the existing operating conditions, operating conditions expected to occur in the future without the proposed project, and operating conditions in the future if the proposed project is constructed. Two basic methodologies were used to analyze the traffic operations along the corridor: intersection level of service analysis and microsimulation.

Intersection level of service analysis uses calculations established by the Transportation Research Board (TRB) in the Highway Capacity Manual (HCM). These calculations, using assumptions related to the number of lanes, type of traffic signal, volume of traffic, etc., translate known or expected traffic conditions into a simple "report card grade" for the intersection. These grades range from Level of Service A (LOS A), the best operating conditions, to LOS F, the worst operating conditions (see
REF _Ref53366287 \h
Exhibit 7
for definitions of levels of service). The City of Hayward, as with most cities, specifies certain inputs to the calculations, as well as what level of service grades are considered acceptable.

Microsimulation analysis uses highly sophisticated models run on computers to simulate what happens to vehicles as they proceed to their destination through an imaginary roadway network. The imaginary network is carefully constructed within the model to attempt to replicate actual conditions vehicles would experience. For this project, a computer program called VISSIM was used. In addition to the technical data that the program develops, it also provides an animated movie depicting the movement of vehicles on the roadway network. This movie currently shows only autos, but it can also show pedestrians, bicycles, and transit vehicles, if desired.

Existing Conditions

A total of 26 intersections were evaluated in this study. The City of Hayward provided historic traffic counts for several of the intersections where traffic counts had been

conducted over the past two years. Traffic counts were then conducted as part of this study for any counts that were not available. Discrepancies between intersections in the counted traffic volumes on Foothill and Mission were "balanced" per City of Hayward instructions to within 10%. The Technical Appendix lists the specific adjustments made to each intersection count. The fina
al balanced existing traffic volumes are shown in the TRAFFIX™ level of service computation sheets presented in the Technical Appendix.

Intersection Level of Service
The AM and PM peak hour level of service was analyzed for the Existing Conditions, No-Project, and the Project scenarios. The level of service was computed using the TRAFFIX™ program and the 1994 Highway Capacity Manual method as specified by the City of Hayward. City of Hayward default values for peak hour factor, percent trucks, etcetera眠牀□獵
were used unless superior information was available.

Exhibit
SEQ Exhibit * ARABIC
. Level of Service Definitions
1994 Highway Capacity Manual Definitions of Signalized Intersection Level of Service

Level of Service	Stopped Delay Per Vehicle	Description
A	<= 5.0 seconds	Low delay, extremely favorable progression, most vehicles arrive on green, many do not stop at all.
B	> 5.0 and <= 15.0	Good progression, more vehicles stop.
C	> 15.0 and <= 25.0	Fair progression, individual cycle failures (some waiting vehicles cannot get through on green), number of vehicles stopping is significant.
D	>25.0 and <= 40.0	Congestion becomes noticeable, longer delays, unfavorable progression, higher volume/capacity ratios, many vehicles stop, individual cycle failures noticeable.

E
> 40.0 and
<= 60.0
High delay values, poor progression, high volume/capacity ratios, frequent cycle failures.

F

> 60.0
Unacceptable to most drivers, oversaturation (more vehicles arrive in an hour than can be served in an hour), high volume/capacity ratios, many cycle failures, poor progression.

Sources: Table 9-1, 1994 Highway Capacity Manual, Transportation Research Board.

Actual cycle lengths and minimum green times for each phase were obtained from city provided Caltrans signal timing sheets for the intersections. A default 3 second per critical phase loss time was used to compute total intersection loss times. The loss times for Foothill/D Street and Foothill/Jackson/Mission were increased to reflect the longer all-red times coded for these two intersections in comparison to other intersections in the corridor.

All signals were coded as actuated and coordinated. Ten pedestrians per hour were assumed to cross each crosswalk. Based on Caltrans Truck Volumes Report for Route 238, heavy vehicles were estimated to account for 2% of the peak hour traffic.

REF _Ref53367137 \h
Exhibit 8
below shows the results of the existing level of service calculations for the study intersections.

The existing conditions analyses were compared to those performed for the Hayward General Plan, and other recent traffic analyses for the corridor. The current analyses are consistent with these prior analyses taking into account the changes in traffic flows that have occurred in the corridor since the General Plan work was performed.
Exhibit
SEQ Exhibit * ARABIC
. Existing Intersection Level of Service
Existing Intersection Operations

Intersection
AM Peak Hour
PM Peak Hour

LOS

V/C
Delay a
LOS
V/C
Delay a

Foothill & Mattox
D
1.00
37.4
E
1.04
49.4

Foothill & Grove
C
0.83
18.8
D
0.98
30.9

Foothill & Hazel
B
0.68
10.7
D
0.96
26.3

Foothill & City Center
B
0.69
14.5
C
0.83
19.1

Foothill & Russell
A
0.38
1.6
A
0.54
2.8

Foothill & A
D
0.87
26.1
E
1.08
51.7

Foothill & B
C
0.82
16.8
B
0.82
14.3

Foothill & C
A
0.66
3.6
B
0.71
8.9

Foothill & D
D
1.03
36.3
D
1.03
37.0

Mission/Foothill/Jackson
E
1.09
45.8
F
1.16
79.8

Jackson & Watkins
D
1.00
31.0
D
0.92

29.6

Mission & Fletcher
B
0.66
12.3
C
0.70
16.9

Mission & Highland
B
0.79
13.4
C
0.88
18.3

Mission & Carlos Bee
F
1.06
62.4
E
1.09
57.4

Mission & Harder
D
0.91
32.0
D
0.94
35.9

Mission & Sorenson
B
0.71
6.3
C
0.81
15.1

Mission & Jefferson/Calhoun
D
0.89
25.1

B
0.88
13.2

Mission & Hancock
A
0.69
3.9
B
0.83
5.4

Mission & Tennyson
C
0.61
20.0
C
0.75
20.6

Mission & La Vista Quarry
A
0.57
3.5
B
0.74
5.1

Mission & Industrial
C
0.73
24.9
D
0.65
27.4

Source: Dowling Associates 2003

a Average stopped delay in seconds per vehicle.

Note: The level of service calculations use a combination of available and new counts which have been balanced to represent typical 2003 conditions and incorporate actual existing Caltrans signal timings.

Microsimulation Model Calibration

The existing traffic counts and roadway geometry (including traffic signal characteristics) were used to create a simulation of existing conditions using the VISSIM program. The primary purpose of using the microsimulation tool for the existing conditions was to calibrate the model to prepare to analyze the future conditions. By properly calibrating the VISSIM model, it is possible to make reasonable estimates of future operating conditions when characteristics such as vehicular volumes or the number of lanes change.

Calibration of the VISSIM model consisted of a review of the turning patterns and link flows in the model, and a comparison of the VISSIM predicted travel times to field measured travel times for the corridor.

Travel times were measured in the field using floating car runs made over a 2-week period in May 2003. The cars traveled the length of the corridor from Mattox to Industrial in the southbound direction, and from Industrial to the I-580 ramps in the northbound direction. The weather ranged from dry to light rain.

REF _Ref53299133 \h
Exhibit 9
below summarizes the results. More detail can be found in the Technical Appendix.

Exhibit
SEQ Exhibit * ARABIC
. Results of Field Measurements of Travel Time

	AM Peak		
	Number of Runs	Mean (min:sec)	Standard Deviation (min:sec)
Northbound	10	13:43	4:29
Southbound	6	16:49	3:25

PM Peak

Number of Runs
Mean (min:sec)
Standard Deviation (min:sec)

Northbound
6
20:56
6:27

Southbound
9
15:00
2:07

The VISSIM model was run several times, each time collecting travel time data from the simulated vehicles. Various adjustments were made to the inputs of the model until the simulated travel time was reasonably close to the field conditions.
REF _Ref53299151 \h
Exhibit 10
below shows the results of the final set of runs for the calibrated VISSIM model.

Exhibit
SEQ Exhibit * ARABIC
. Results of VISSIM Calibration Runs
AM Peak
Number of Runs
Mean (min:sec)
Standard Deviation (min:sec)

Northbound
10
14:33
00:14

Southbound
9*
17:43
01:00

PM Peak

Number of Runs
Mean (min:sec)
Standard Deviation (min:sec)

Northbound
10
23:30
00:57

Southbound
10
16:52
00:34

* One extreme run of 27 minutes excluded from results

The mean travel time results for the calibrated VISSIM model are well within the 95% confidence interval for the field measured mean results for the AM peak hour and for the Northbound PM peak hour (see
REF _Ref53299170 \h
Exhibit 11
below). The difference of the means for the Southbound PM peak hour is 01:52 (min:sec) while the 95% confidence interval is 01:36 (min:sec).

Exhibit
SEQ Exhibit * ARABIC
. Two-sided "T" Test for Difference of VISSIM and Field Means

Peak Direction	Difference of Means (min:sec)	95% Confidence Interval (min:sec)
AM Peak Hour		
Northbound	00:50	03:10
Southbound	01:50	03:25

PM Peak Hour
Northbound
02:34
06:27

Southbound
01:52
01:36

The calibration objective is for the difference of the means to be less than the 95% confidence interval.

Future Conditions

This section presents the traffic operations analysis results for the Year 2025 no-project and baseline corridor improvement project scenarios.

Traffic Volumes

The traffic volumes used for the future analyses were developed using the output of the traffic forecasting effort described in Chapter II of this report above.

Signal Timing Optimization

The signal timings for the No-Project and Project scenarios were optimized using the Synchro program. As noted previously existing signal timing plans were used for existing conditions and no futher optimization was performed, since Caltrans has reportedly optimized the current signal settings.

The VISSIM simulation for the No-Project scenario was first reviewed to identify wasteful, uneven queuing across lanes on the side streets caused by predicted high left turn demands in 2025 and the lack of left turn signal protection for the side streets. Left turn phases were added to Grove, Hazel, and City Center to correct this situation for both the No-Project and Project scenarios. Synchro was then used to partition the network into signal coordination groups. The cycle lengths, splits, and offsets were optimized on a network-wide basis using Synchro. The resulting signal timings were input into TRAFFIX
™ for the level of service calculations for the No-Project and Project scenarios.

Intersection Level of Service

Using the same methodology as for the existing volumes, intersection level of service was calculated for Year 2025 forecast volumes for conditio獮眠瑩澡
ns without the proposed project and with the proposed project.

The Hayward Travel Demand Model peak hour forecasts were reduced 5% to account for peak spreading (see discussion in Chapter on Forecasts). However, it is important to note that this 5% reduction for peak spreading does not fully account for the effects of capacity limits on downstream flow rates, as would happen in real life and in the VISSIM

analysis. Any intersection reaching capacity would in real life prevent the full volume from arriving at the next intersection. The intersection level of service analysis is still useful, however, as it gives a clear sense of the increase in demand and/or the immediate benefit of changing an intersection's capacity.

REF _Ref53299102 \h
Exhibit 12
below shows a comparison of Year 2025 intersection level of service with and without the project. The results indicate that the project will improve operating conditions as compared to the no project case at many intersections, and at others it will result in approximately the same level of service. At a few intersections, the level of service will worsen slightly – this result is not unexpected, given the significant increase in expected traffic volumes.

Exhibit
SEQ Exhibit * ARABIC
. Future Year 2025 Intersection Level of Service

Future Intersection Operations

	No Project				Project			
Intersection	AM Peak Hour			PM Peak Hour	AM Peak Hour			PM Peak Hour
	LOS	V/C	Delay a	LOS	V/C	Delay a	LOS	V/C	Delay a	LOS	V/C	Delay a
Foothill & Mattox	F	1.12	75.5									

F
1.14
81.9
F
1.14
82.2
F
1.16
89.8

Foothill & Grove
E
1.04
48.5
F
1.10
71.7
E
1.02
45.7
E
1.03
44.6

Foothill & Hazel
C
0.84
21.0
E
1.10
57.9
C
0.80
19.1
E
1.03
41.9

Foothill & City Center
C
0.78
21.1
E
1.14
56.4
C

0.83
22.5
E
1.09
55.6

Foothill & Russell
A
0.49
1.6
A
0.65
2.6
A
0.49
0.4
A
0.53
0.4

Foothill & A
F
1.20
111.4
F
1.36
191.0
F
1.51
192.7
F
1.49
190.7

Foothill & B
F
1.11
65.2
F
1.23
103.6
D
1.01
36.5
D
1.02

37.8

Foothill & C
C
0.91
16.8
F
1.11
64.0
B
0.76
9.2
B
0.87
14.8

Foothill & D
F
1.29
165.7
F
1.27
144.6
F
1.10
78.9
F
1.20
93.4

Mission/Foothill/Jackson
E
1.06
53.5
F
1.42
211.2
B
0.87
14.1
C
0.82
15.1

Jackson & Watkins
F

1.30
119.6
F
1.41
233.2
E
0.92
57.7
E
0.88
55.4

Mission & Fletcher
C
0.77
19.7
C
0.89
15.9
C
0.86
19.5
C
0.85
24.7

Mission & Highland
C
0.93
23.5
E
1.10
42.3
C
0.80
15.5
C
0.84
16.8

Mission & Carlos Bee
F
1.07
61.5
F
1.18

91.1
D
0.96
38.5
E
1.01
43.8

Mission & Harder
F
1.13
64.6
F
1.14
73.4
F
1.26
114.5
F
1.27
125.9

Mission & Sorenson
B
0.89
8.8
C
0.98
21.5
B
0.85
6.7
B
0.91
14.6

Mission & Jefferson/Calhoun
F
1.30
176.9
F
1.19
112.7
F
1.14
63.2

F
1.15
69.9

Mission & Hancock
B
0.76
6.8
B
0.87
9.5
B
0.76
5.6
B
0.86
7.4

Mission & Tennyson
D
0.90
37.9
E
1.05
48.8
F
1.13
67.3
E
1.06
47.5

Mission & Industrial
D
0.87
30.0
D
0.83
27.0
E
1.02
41.6
E
1.04
55.8

Number LOS “F” Intersections
8

11

6

5

Source: Dowling Associates 2003

a Average stopped delay in seconds per vehicle.

La Vista Quarry is closed under No-Project and Project scenarios. Russell is closed under Project Scenario.
Level of service analyses assumes 5% peak spreading of peak hour demands.

State Route 238 Corridor Improvement Project
Transportation Analyses

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State Route 238 Corridor Improvement Project
Transportation Analyses

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AGENDA DATE 10/22/03
AGENDA ITEM 2

CITY OF HAYWARD
STAFF REPORT

TO: Route 238 Working Group

FROM: Director of Public Works

SUBJECT: Transportation Analysis Results (Continued)

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